

CLAIMS

1. A clean device comprising a lid and a main body and having an inside environment kept cleaner than an outside environment to receive a substrate from a clean box, which is kept highly clean inside and has the substrate stored in the inside, and process the substrate, characterized in that:

the clean device comprises a load port portion equipped with an opening/closing mechanism having a turnable latch pin to separate the lid from the main body or couple the lid to the main body with the clean box laid thereon;

the lid of the clean box has: a cam plate capable of engaging with the latch pin and actuating in accordance with a turning movement of the latch pin; and a latch member protruding to an outside of the lid to engage a latch hole of the main body of the clean box or being confined within the lid to be released from the latch hole of the main body of the clean box in accordance with an actuation of the cam plate;

the lid of the clean box further comprises a non-circular receiving hole;

25 the opening/closing mechanism further comprises a protrusion that can be fittingly inserted into the receiving hole;

the latch pin becomes capable of engaging the cam plate and the protrusion of the opening/closing mechanism is fittingly inserted into the lid of the clean box when the clean box is laid on the load port  
5 portion; and

the protrusion and the receiving hole become capable of engaging with each other in accordance with a turning movement of the latch pin.

10 2. A clean device according to Claim 1,  
characterized in that:

the protrusion comprises a brim portion at a tip thereof; and

15 the opening/closing mechanism is coupled to the lid through engagement of the brim portion with a seat of the receiving hole after the protrusion is inserted into the receiving hole.

20 3. A clean device according to Claim 2,  
characterized in that:

the brim portion has a cross-sectional area that is slightly smaller than and substantially similar in shape to the receiving hole so that the brim portion can be fittingly inserted into the  
25 receiving hole;

the protrusion further comprises a root portion smaller in cross-sectional area than the brim

portion; and

the opening/closing mechanism and the lid are coupled to each other through engagement between the brim portion and the seat of the receiving hole  
5 resulting from rotation of the root portion after the protrusion is inserted from the brim portion into the receiving hole.

4. A clean device according to Claim 2,  
10 characterized in that:

the brim portion has a cross-sectional area that is slightly smaller than and substantially similar in shape to the receiving hole so that the brim portion can be fittingly inserted into the  
15 receiving hole;

the protrusion further comprises a root portion smaller in cross-sectional area than the brim portion;

the brim portion and the seat of the receiving  
20 hole have faces spaced apart from each other by a predetermined distance when the protrusion is inserted from the brim portion into the receiving hole to a predetermined position; and

the brim portion and the seat of the receiving  
25 hole engage each other when the protrusion is moved by the predetermined distance by rotating the root portion.

5. A clean device according to Claim 3 or 4,  
characterized in that:

the root portion is rotated while the latch  
5 member is rotated.

6. A clean device according to any one of  
Claims 1 to 4, characterized in that:

the load port portion comprises:

10 a port door that is raised and lowered and has  
one face on which the lid is laid;

a buffer chamber defined by wall surfaces  
arranged surrounding an outer periphery of the port  
door in a region where the port door is raised and  
15 lowered, and by a bottom face arranged opposed to the  
other face of the port door;

raising/lowering means joined to the port door,  
for raising and lowering the port door along a  
direction perpendicular to a face of the port door;  
20 and

a bellows arranged along an outer periphery of  
the raising/lowering means;

the bellows is coupled at one end thereof to  
the bottom face of the buffer chamber; and  
25 the bellows is fixed at the other end thereof  
to the raising/lowering means outside the buffer  
chamber.

7. A clean device comprising a lid and a main body and having an inside environment kept cleaner than an outside environment to receive a substrate  
5 from a clean box, which is kept highly clean inside and has the substrate stored in the inside, and process the substrate, characterized in that:

the clean device comprises a load port portion for separating the lid from the main body or coupling  
10 the lid to the main body with the clean box laid thereon, to receive the substrate from the clean box;

the load port portion comprises:

a port door that is raised and lowered and has one face on which the lid is laid;

15 a buffer chamber defined by wall surfaces arranged surrounding an outer periphery of the port door in a region where the port door is raised and lowered, and by a bottom face arranged opposed to the other face of the port door;

20 raising/lowering means joined to the port door, for raising and lowering the port door along a direction perpendicular to a face of the port door; and

25 a bellows arranged along an outer periphery of the raising/lowering means;

the bellows is coupled at one end thereof to the bottom face of the buffer chamber; and

the bellows is fixed at the other end thereof to the raising/lowering means outside the buffer chamber.

5        8. A method in which a clean device comprising a lid and a main body and having an inside environment kept cleaner than an outside environment to receive a substrate from a clean box, which is kept highly clean inside and has the substrate stored  
10      in the inside, and process the substrate, is used to separate the lid from the main body of the clean box to prepare for extraction of the substrate, characterized in that:

the clean device comprises a load port portion  
15      equipped with an opening/closing mechanism having a turnable latch pin to separate the lid from the main body or couple the lid to the main body with the clean box laid thereon;

the load port portion comprises:  
20      a port door capable of being raised and lowered and having one face on which the lid is laid with an outer face of the lid being in contact with the one face; and

a buffer chamber defined by wall surfaces  
25      arranged surrounding an outer periphery of the port door in a region where the port door is raised and lowered, and by a bottom face arranged opposed to the

other face of the port door;

the lid of the clean box has: a cam plate capable of engaging with the latch pin and actuating in accordance with a turning movement of the latch 5 pin; and a latch member protruding to an outside of the lid to engage a latch hole of the main body of the clean box or being confined within the lid to be released from the latch hole of the main body of the clean box in accordance with an actuation of the cam 10 plate;

the lid of the clean box further comprises a non-circular receiving hole;

the opening/closing mechanism further comprises a protrusion that can be fittingly inserted into the 15 receiving hole;

the clean device comprises a first exhaust port arranged close to the port door in the buffer chamber and a second exhaust port arranged apart from the first exhaust port of the buffer chamber; and 20  
the method comprises:

making the latch pin capable of engaging with the cam plate when the clean box is laid on the load port portion, and fittingly inserting the protrusion of the opening/closing mechanism into the lid of the 25 clean box;

evacuating an interface portion where the port door and the lid are joined to each other, from the

first exhaust port;

evacuating the buffer chamber from the second exhaust port; and

lowering the port door and transferring the  
5 substrate into the buffer chamber.

9. A method according to Claim 8, characterized in that:

the clean device comprises a first pressure  
10 sensor connected to a vicinity of the first exhaust port and a second pressure sensor connected to a vicinity of the second exhaust port;

the evacuating of the interface portion, where the port door and the lid are joined to each other,  
15 from the first exhaust port includes checking a pressure by means of the first pressure sensor; and

the evacuating of the buffer chamber from the second exhaust port includes checking a pressure by means of the second pressure sensor.

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10. A method in which a substrate is processed by using a clean device comprising a lid and a main body and having an inside environment kept cleaner than an outside environment to receive a substrate  
25 from a clean box, which is kept highly clean inside and has the substrate stored in the inside, and process the substrate, and in which a preparation for

returning the processed substrate into the clean box  
is performed, characterized in that:

the clean device comprises a load port portion  
equipped with an opening/closing mechanism having a  
5 turnable latch pin to separate the lid from the main  
body or couple the lid to the main body with the  
clean box laid thereon;

the load port portion comprises:

a port door capable of being raised and lowered  
10 and having one face on which the lid is laid with an  
outer face of the lid being in contact with the one  
face; and

a buffer chamber defined by wall surfaces  
arranged surrounding an outer periphery of the port  
15 door in a region where the port door is raised and  
lowered, and by a bottom face arranged opposed to the  
other face of the port door;

the lid of the clean box has: a cam plate  
capable of engaging with the latch pin and actuating  
20 in accordance with a turning movement of the latch  
pin; and a latch member protruding to an outside of  
the lid to engage a latch hole of the main body of  
the clean box or being confined within the lid to be  
released from the latch hole of the main body of the  
25 clean box in accordance with an actuation of the cam  
plate;

the lid of the clean box further comprises a

non-circular receiving hole;

the opening/closing mechanism further comprises a protrusion that can be fittingly inserted into the receiving hole;

5       the clean device comprises a first exhaust port arranged close to the port door in the buffer chamber and a second exhaust port arranged apart from the first exhaust port of the buffer chamber; and  
the method comprises:

10      evacuating the buffer chamber from the second exhaust port;

raising the port door and transferring the substrate from an inside of the buffer chamber to an upper portion of the load port portion; and

15      supplying nitrogen gas to an interface portion where the port door and the lid are joined to each other.

11. A method according to Claim 10,  
20 characterized in that:

the clean device comprises a first pressure sensor connected to a vicinity of the first exhaust port and a second pressure sensor connected to a vicinity of the second exhaust port;

25      the supplying of nitrogen gas to the interface portion includes checking a pressure by means of the first pressure sensor; and

the evacuating of the buffer chamber from the second exhaust port includes checking a pressure by means of the second pressure sensor.

- 5        12. A substrate processing device load port on which a clean box including a main body and a lid, which is laid with a substrate and fitted to the main body, is laid, for extracting the substrate from an inside of the cleaning box, comprising:
  - 10      a port door having an outer face on which the lid is laid;
  - a buffer chamber defined by wall surfaces arranged surrounding an outer periphery of the port door, and by a bottom face arranged opposed to an inner face of the port door;
  - 15      raising/lowering means joined to the inner face of the port door, for raising and lowering the port door along a direction perpendicular to a face of the port door; and
  - 20      a bellows arranged along an outer periphery of the raising/lowering means,
  - the substrate processing device load port being characterized in that:
  - the bellows is coupled at one end thereof to
  - 25      the bottom face of the buffer chamber; and
  - the bellows is fixed at the other end thereof to the raising/lowering means outside the buffer

chamber.

13. An opening/closing mechanism arranged in a substrate processing device to extract a substrate from a clean box and process the substrate by means of the substrate processing device, the cleaning box having: a lid which has a cam plate and a latch member that moves to protrude from the lid or to be confined within the lid by means of the cam plate, and on which the substrate can be laid; and a main body that is coupled to the lid by means of a latch hole for receiving a tip of the latch member when the latch member protrudes from the lid, characterized in that:
  - 15       the opening/closing mechanism comprises a rotatable latch pin for engaging the cam plate; the lid further comprises a non-circular receiving hole;
  - 20       the opening/closing mechanism comprises a protrusion that can be fittingly inserted into the receiving hole; and
  - 25       the opening/closing mechanism and the lid are coupled to each other through engagement between the protrusion and the receiving hole to remove the lid from the clean box.

14. An opening/closing mechanism according to

Claim 13, characterized in that:

the protrusion comprises a brim portion at a tip thereof; and

the opening/closing mechanism is coupled to the  
5 lid through engagement between the brim portion and a seat of the receiving hole after the protrusion is inserted into the receiving hole.

15. An opening/closing mechanism according to  
10 Claim 14, characterized in that:

the brim portion has a cross-sectional area that is slightly smaller than and substantially similar in shape to the receiving hole so that the brim portion can be fittingly inserted into the  
15 receiving hole;

the protrusion further comprises a root portion smaller in cross-sectional area than the brim portion; and

the opening/closing mechanism and the lid are  
20 coupled to each other through engagement between the brim portion and the seat of the receiving hole resulting from rotation of the root portion after the protrusion is inserted from the brim portion into the receiving hole.

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16. An opening/closing mechanism according to  
Claim 14, characterized in that:

the brim portion has a cross-sectional area that is slightly smaller than and substantially similar in shape to the receiving hole to such an extent that the brim portion can be fittingly inserted into the receiving hole;

the protrusion further comprises a root portion smaller in cross-sectional area than the brim portion;

the brim portion and the seat of the receiving hole have faces spaced apart from each other by a predetermined distance when the protrusion is inserted from the brim portion into the receiving hole to a predetermined position; and

the brim portion and the seat of the receiving hole engage each other when the protrusion is moved by the predetermined distance by rotating the root portion.

17. An opening/closing mechanism according to  
20 Claim 15 or 16, characterized in that:

the root portion is rotated while the latch member is rotated.

18. An article accommodating container  
25 comprising: a main body having an inner space capable of accommodating an article and an opening provided vertically below the inner space; and a lid for

sealing the inner space by closing the opening,  
characterized in that:

the main body and the lid have a depressurized  
space arranged therebetween;

5 the lid has a falloff preventing member capable  
of protruding from an outer periphery of the lid;

the main body has a depressed portion for  
accommodating the falloff preventing member without  
coming into contact with the falloff preventing  
10 member when the falloff preventing member protrudes  
from the outer periphery of the lid; and

the falloff preventing member comes into  
contact with an inner periphery of the depressed  
portion when a depressurized state of the  
15 depressurized space for sealing the inner space by  
means of the lid is broken with the falloff  
preventing member protruding from the outer periphery  
of the lid.

20 19. An article accommodating container  
according to Claim 18, characterized in that:

the depressurized space is identical with the  
inner space.

25 20. An article accommodating container  
according to Claim 18, characterized in that:

the depressurized space is different from the

inner space.

21. An article accommodating container according to Claim 18, characterized in that:

5       the main body and the lid respectively have a first flat face and a second flat face that are horizontally opposed to each other;

          the falloff preventing member protrudes horizontally from the second flat face; and

10      the depressed portion is formed in the first flat face.

22. An article accommodating container according to Claim 18, characterized in that:

15     the inner space assumes a circular or rectangular horizontal cross-sectional shape whose four corners comprise part of a circular arc having a predetermined diameter.